Introduction and Background

West Valley Water District (District) and the City of Rialto (Rialto) provide water for residential and commercial/industrial uses in Rialto, California. The District and Rialto obtain water from several different sources, including groundwater wells, surface water sources, and the State Water Project; however, groundwater accounts for more than two-thirds of these supplies (Egan 2006; ERSC 2006).

The District is mainly located in the southwestern portion of San Bernardino County, and to a lesser amount within northern Riverside County. The District is situated within the San Bernardino Valley and is within the Santa Ana River (SAR) Watershed. The majority of the District's service area is located in the north-central part of the Rialto-Colton Groundwater Basin (Basin). Groundwater has been a primary water source in the region for decades, and the Basin has provided a substantial portion of the overall groundwater supply.

In recent years, perchlorate has been detected in several of the District's and Rialto's production wells at concentrations exceeding the action level and maximum contaminant level (MCL) of 6 micrograms per liter (µg/L) established by the California Department of Public Health Services (CDPH) in 2007. More specifically, groundwater samples collected from the District Well No. 11 and Rialto Well No. 6 indicate that perchlorate, a chemical causing acute health effects, exceeds more than three times the 6 µg/L MCL.

Untreated groundwater with elevated levels of perchlorate, nitrate, and volatile organic compounds (VOCs) is considered an extremely impaired source by CDPH. For this reason, the District and Rialto have removed adversely impacted production wells from service, pending the installation of appropriate treatment measures. The loss of these wells has made it challenging for the District and Rialto to maintain operational flexibility and to meet seasonal peak water demands.

The proposed Sentinel Well Project is part of a greater project called the "Groundwater Wellhead Treatment System Project (GWTSP)" which involves the construction and operation of a groundwater wellhead treatment system to remove perchlorate, nitrate and VOCs, including trichloroethylene (TCE), from groundwater coming from two Public Water System (PWS) drinking water production wells: Rialto Well No. 6 and District Well No. 11 located in the Basin. The WTP will be the first biological treatment plant in California used for drinking water and will use a multiple treatment-train Fluidized Bed Bioreactor (FBR) system to treat for perchlorate and nitrate coming from the groundwater wells. A sentinel well is needed for Rialto Well 6 because no existing well is located or perforated to adequately meet the 97-005 surveillance criteria. Rialto Wells 3, 4, and 5 already serve as sentinel wells for District Well No. 11. The Project has been developed to meet the requirements set forth in the CDPH Policy Memo 97-005 Policy Guidance for Direct Domestic Use of Extremely Impaired Sources (CDPH 97-005 Policy).

The District and Rialto have established a cooperative agreement (Att5_LGA12_WestValleyWD_ProjD_2of2.pdf) to restore the two contaminated production wells to service (Rialto Well No. 6 and District Well No. 11). Under this agreement, the District has taken the lead for the planned construction and operation of a groundwater wellhead treatment system that will remove perchlorate and nitrate from groundwater and reduce VOCs concentrations in groundwater. Groundwater pumped from Rialto Well No. 6 (located off Etiwanda Avenue in Rialto) and District Well No. 11 (located off Willow Avenue in Rialto) will be conveyed approximately 6,300 linear feet via existing and newly constructed underground pipelines to a treatment facility currently

under construction at the District's headquarters, located at 855 West Base Line Road, Rialto, California. The successful completion and operation of the treatment system will result in approximately 2,000 gallons per minute (gpm) of treated groundwater restored to the District's drinking water supply for distribution.

Goals and Objectives

The Project has the following goals and objectives:

- Install a sentinel well as one required component to put contaminated drinking wells back into service.
- Provide water quality data and feedback about the current groundwater basin status before and after the two contaminated drinking wells are put back into service.
- Provide input for groundwater modeling that can determine adequacy of remedial actions.
- Stabilize groundwater supplies in the Rialto-Colton Basin and reclaim operational flexibility.

Purpose and Need

The Project has been developed to meet the requirements set forth in the CDPH 97-005 Policy. Completion of the Project will enable Rialto Well No. 6 to be put back into service once the 97-005 permit is finalized.

The loss of two drinking wells due to groundwater contamination has made it difficult for the District and Rialto to maintain operational flexibility and meet seasonal peak water demands. Because of rising perchlorate concentrations, Rialto declared a water supply emergency and has joined with the District in an effort to stabilize local water supplies. Large portions of groundwater in the Rialto-Colton Groundwater Basin are currently contaminated with perchlorate, nitrate, and VOCs, including TCE.

The Rialto-Colton Basin is part of the Upper Santa Ana River (SAR) Watershed, located in San Bernardino County. The *Upper Santa Ana River Watershed Integrated Regional Water Management Plan* (IRWMP) identified the "Remediation Extraction Wells to Capture High-Concentration Perchlorate Contamination in Rialto-Colton Basin" as a project to meet the IRWMP's goals and objectives by meeting the water supply benefits and providing water quality benefits as described below.

The Project will allow monitoring of the water quality conditions in the contaminated groundwater basin. As a result of this Project, the District and Rialto will be able to restore water supply lost due to water quality impairment and decrease reliance on imported water. The amount of water supply to be restored is 4,302 AF/yr, or over 30 years (projected life of treatment project), approximately 129,060 AF.

The water supply benefits include: 1) restoring groundwater supplies from two wells that have been idled due to perchlorate, nitrate and VOC contamination; 2) by restoring these wells, there will be less of a need for imported water; and 3) the use of local-groundwater supplies instead of imported water, provides a lower-energy usage, lower-cost and more reliable water supply; and 4) through interconnections with the District, this restored water supply can be delivered to other water retailers in the area.

The Project provides water quality benefits primarily in that it is a required component for the larger WTP Project to treat contaminated groundwater. As such, the Sentinel Well Project will provide water quality benefits related to:

1) The numerical mass of salt/contaminants removed. Approximately 3,300 tons of perchlorate/nitrate destroyed, and a total salts load of 12,000 tons removed from groundwater.

2) The benefit derived from remediating and abating a severe, and still migrating plume of contamination. This benefit will also result in minimizing the total duration and cost required for cleanup, and help decrease the adverse impacts to groundwater wells downgradient of the project, and also in other groundwater Basins.

3) The benefit derived from the full-scale CDPH-permitted, implementation of a viable sustainable green-remediation technology for destroying perchlorate and nitrate contaminants from drinking water in the form of the FBR technology.

Project Description

The proposed Sentinel Well will serve as a groundwater monitoring well situated between Rialto Well No. 6 (sensitive downgradient receptor) and the 160-acre area (inferred upgradient source of groundwater contaminant plume). Chemical impacts first detected in the Sentinel Well will serve as a warning that impaired groundwater may be moving closer to Rialto Well No. 6. The Sentinel Well will be located far enough upgradient of Rialto Well No. 6 (within the 10-year capture zone) to allow enough time to initiate mitigative measures to prevent contamination from reaching the water supply well.

A capture zone refers to the three-dimensional region that contributes the groundwater extracted by one or more water wells, and a capture zone analysis is the process of interpreting the extents of the actual capture zone. A capture zone analysis was conducted on behalf of the District to estimate the source-water areas of District Well No. 11 and Rialto Well No. 6 for time horizons of 2, 5, 10, 15, 20, and 30 years, using an approach consistent with the general guidelines for capture zone evaluation described in USEPA (2008). Based on this analysis, it was determined that a sentinel well was needed for Rialto Well 6 because no existing well was located or perforated to adequately meet the 97-005 surveillance criteria. Rialto Wells 3, 4, and 5 already serve as sentinel wells for District Well No. 11.

The District proposes the installation of the Sentinel Well in the vicinity of the West Base Line Road and Lilac Avenue intersection for surveillance monitoring purposes of Rialto Well No. 6. The Sentinel Well is proposed to be installed on the Rialto United Methodist Church property located at 1230 N. Lilac Avenue (Figure 1). This location is approximately 3,000 feet northwest of Rialto Well No. 6 and lies within the 10-year capture zone. By placing the Sentinel Well within the 10-year capture zone, the District has ample time to initiate mitigative measures to prevent any possible contamination water from reaching Rialto Well No. 6.

Quality and Usefulness of Acquired Data

As discussed previously, the proposed project is just one of many activities that the District is conducting to protect groundwater quality by addressing the known presence of perchlorate in groundwater. The proposed project will provide both groundwater quality data and hydrogeologic characterization data in a portion of the basin located near the District's and Rialto's two contaminated drinking wells.

The sentinel monitoring well will complement existing and proposed monitoring activities performed by the USEPA, CDPH, and DTSC.

Ongoing Use of Project Information and Work Products

Following well construction and initial well sampling, the well will be equipped with dedicated sampling equipment to be used for future groundwater monitoring. This data will also be made available to the

California DWR per the requirements of California Water Code (CWC) 10795.19.

The District and Rialto are dedicated to continued monitoring of the wells. The District will provide personnel and funding to perform field sampling and laboratory testing for groundwater monitoring into the future, and no additional grant funding will be necessary for this future monitoring. The continued monitoring will include head (water level) measurements along with water quality samples to monitor changes in concentrations of perchlorate and other potential chemicals of concern identified in the initial groundwater sampling event. These data will be used to help the District and the project stakeholders plan for future pumping scenarios in order to avoid pumping contaminated water, and the data may help the stakeholders plan for perchlorate containment strategies into the future.

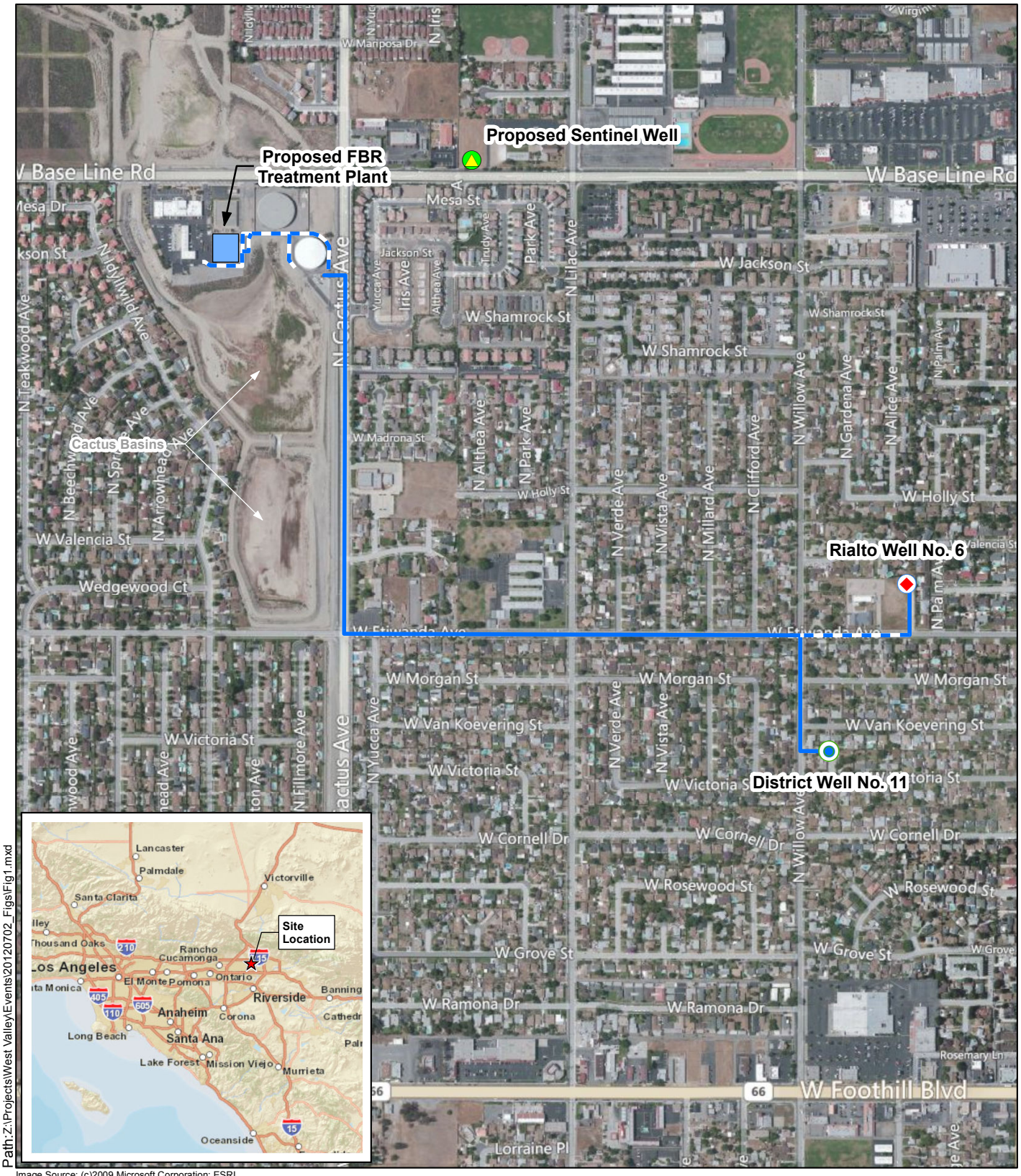

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Image Source: (c)2009 Microsoft Corporation; ESRI
Note: Figure Adapted from LSA, 2009
All locations and boundaries are approximate.

Legend

- Rialto Well #6
- WVWD Well #11
- Proposed Sentinel Well
- Existing Pipeline
- Proposed Pipeline
- Proposed FBR Treatment Plant

N

0 400 800

Scale: Feet

Kennedy/Jenks Consultants

West Valley Water District
Rialto, California

Regional and Well Location

Figure 1